Mycelium Fabrication

Jess Saldaña, *Placebe/Placebo*, 2020
Mycelium propagation on Inkjet print

This two part workshop series in spring 2023 encouraged participants to learn **sustainable making techniques** including mold making and casting with mycelium to create functional design and experimental art objects with:

Rebecca Naegele, Design Center Coordinator and **Jess Saldaña**, Media Center Specialist

Mold Making for Mycelium Fabrication March 1
Casting with Mycelium March 8

What is Mycelium?

Mycelium (plural mycelia) **is the root-like structure of a fungus** consisting of a mass of branching, thread-like filament structure.

Mycelia are vital in terrestrial and aquatic ecosystems for their role in the decomposition of plant material. Fungi absorb nutrients from their environment through mycelia. They contribute to the organic fraction of soil, and their growth releases oxygen back into the atmosphere and turns the carbon they absorb into carbohydrates for soil.

Benefits of Fabricating with Mycelium

Mycelium-based objects are **biodegradable** and backyard compostable; they are **non-toxic and chemical free**. When harnessed as a technology, mycelium helps replace plastics that are rapidly accumulating in the environment.

Commercially produced mycelium products include: packaging, clothing, food, and construction – everything from leather to plant-based steak, as well as bricks, lamp shades, sound proofing foam, and more...

Looking at cast mycelium samples

Notice: shape, texture, weight, porosity, density, strength, color

We've created cast mycelium bricks, egg-carton forms for packaging or sound proofing, and lampshades. What would you like to fabricate with mycelium?

Darkness and Light

Mycelia need a dark environment to thrive. Mycelia is often growing in soil and plant systems. This underground **mycorrhizal network** connects individual plants together via their root systems to transfer water, nitrogen, carbon, and minerals. The mycorrhizal network has been said to be the **communication network of the woods**.

Mushrooms and mycelia are not the same. Mushrooms are the fruiting body of the mycelial network.

Made in the Design Center

Jess Saldaña, *Growth as Exposure*, 2023
Mycelia over a 2 week period on
black and white photo print, 5.5 x 7.5 inches

We discovered that the longer we kept our pieces in the dark, the brighter with mycelial growth they became. The myco-photo pictured above **illustrates mycelia growth** slowly taking over a photo printed on commercial photo paper. The mycelium was left to grow on hemp substrate about three weeks in complete darkness.

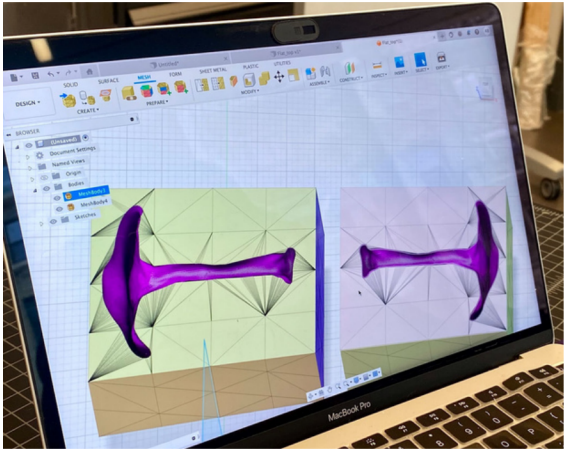
Mold Making for Mycelium

What you'll need:

Tools including vacuum former
Objects to cast/reproduce

Clear PETG sheets are heated by the vacuum former and pulled down over a small, hard object until the plastic forms a mold around the object. Small non-porous objects with a flat side, no undercuts; and not meltable or pliable work best.

Digital molding processes

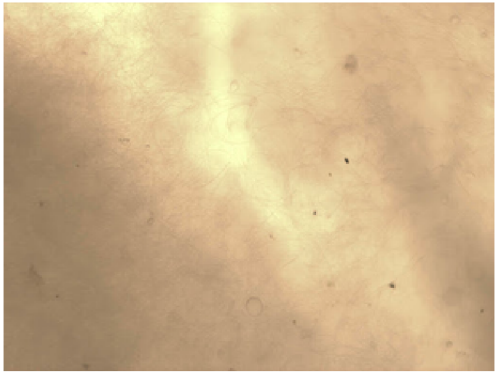


3D Printed Moldmaking

3D model the inverse of a 3D object file in Fusion 360 or Rhino; slice in two

1. Slice each mold half in Cura
2. Export to 3D print
3. 3D print with TPU flexible filament

Mycelium Growing



Mycelia grown in the Design Center.
Micrograph rendered in Altschul.

What you'll need:

- Pre-inoculated hemp substrate
- Flour
- Water
- Sterile work environment
- Alcohol for cleaning tools
- Dark, humid environment

Substrates for mycelia growth

Fungal systems composed of mycelium are found in/on soil and many other substrates. A **substrate** is a biological substance that the mycelium eats and spreads onto, usually a biological material.

Mycelium has been known to absorb toxic materials as well, which is why it has been used for soil remediation in contaminated areas. This process is known as **mycoremediation**. The substrate we use is hemp based.

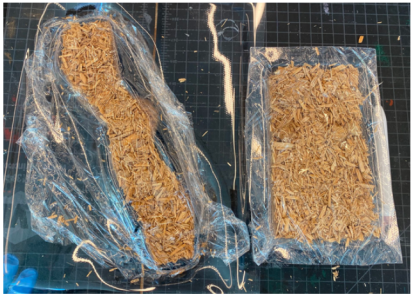
Hemp substrate with mycelia growth

Breaking up substrate for the casting process

Casting Mycelium

What you'll need:

- Sterile work environment
- Alcohol spray to clean molds
- Nitrile gloves
- Mycelia-grown substrate (1 week+).
- Nonporous, inorganic molds for casting
- Plastic wrap (backyard compostable)
- Exacto knife / scissors
- Dark, humid environment
- Natural pigments and collage materials
- Oven or dehydrator to bake cast objects



Casting Process

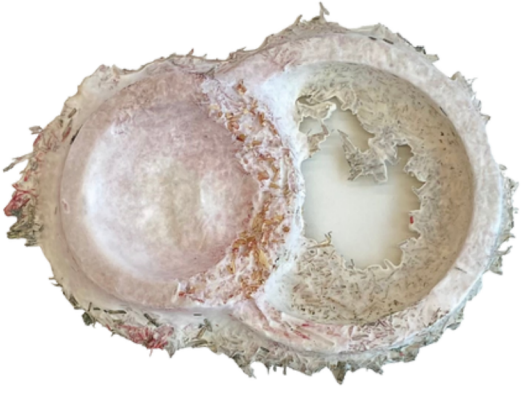
- Wear nitrile gloves throughout this process to avoid contaminating the substrate.
- Sterilize your non-porous, inorganic molds and any containers used with alcohol.
- Break up the mycelia-grown substrate in a sterilized container
- Press the substrate into the molds with pressure and cover with biodegradable plastic wrap; poke small holes.
- Cover the cast molds with a black tarp to create a dark, humid environment
- Let mycelium grow for about a week
- Check on mycelia growth after a week - if full mycelium growth, bake!

Dehydrating / Baking

We bake these objects at 165F overnight in our dehydrator; you could also bake at a higher temperature for less time.

The baking process stops the growth of the mycelia and hardens the object with the strength of the mycelia having grown throughout and digested the substrate.

Student work!



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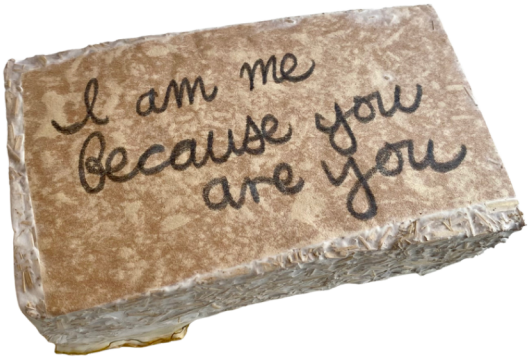

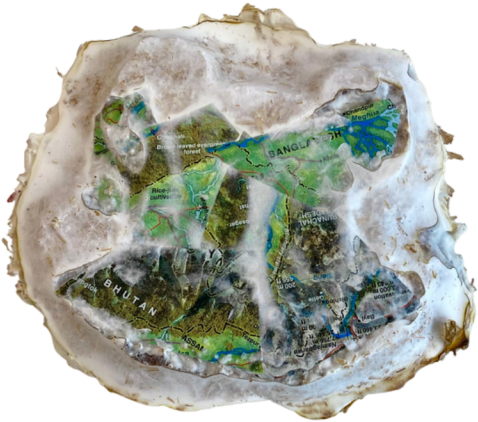

This workshop series was developed and led by Rebecca Naegele, Design Center Coordinator, in collaboration with Jess Saldaña, Media Center Specialist in Spring 2023.

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